(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

10/528764

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
1 August 2002 (01.08.2002)

PCT

(10) International Publication Number
WO 02/060198 A1

(51) International Patent Classification[7]: H04Q 7/22

(21) International Application Number: PCT/CH01/00057

(22) International Filing Date: 25 January 2001 (25.01.2001)

(25) Filing Language: English

(26) Publication Language: English

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(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

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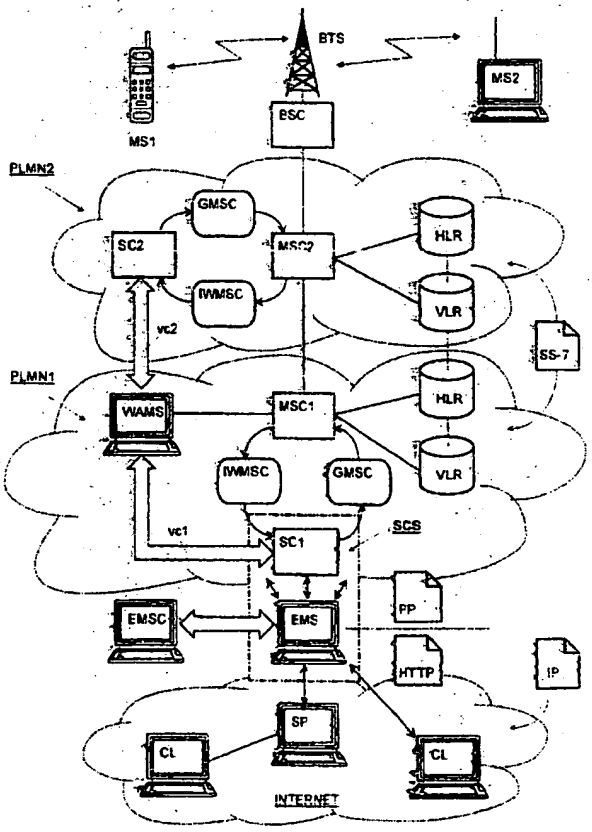
(54) Title: METHOD AND MESSAGE SERVER FOR CONVEYING MESSAGES BETWEEN A MOBILE TELECOMMUNICATIONS NETWORK AND AN IP NETWORK



(57) Abstract: Method to convey messages between a service centre (SC) of a mobile telecommunications network such as a GSM, TDMA, CDMA or 3G (MMS) system and clients (CL) in an IP network, such as the Internet, which are using a standardised communication protocol a) receiving messages in the message server (EMS) from the service centre (SC) based on a protocol used in said service centre (SC), converting said messages into messages based on the standardised communication protocol used by clients (CL) in the IP network and forwarding the converted messages to addressed clients (CL).

WO 02/060198 A1

Published:
— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Method and message server for conveying messages between a mobile telecommunications network and an IP network

The present invention relates to a method, a message server, a service centre comprising said message server and a telecommunications network for conveying messages between a mobile telecommunications network and an IP network according to claim 1, claim 6, claim 12 respective claim 13.

More particularly the present invention relates to a method for conveying messages between a mobile telecommunications network for example as specified in the GSM (Global System for Mobile Communications) standards, the TDMA standards, the CDMA standards, the 3G standards (MMS) as well as in the Signalling System No. 7, IS-41 and IS-95 protocol standards and a network using the internetworking protocols TCP/IP instead. Networks using the internetworking protocols TCP/IP are the Internet, or corporate Intranets or Extranets.

The term message used in this document particularly relates to short messages as defined in the above mentioned standards.

BACKGROUND OF THE INVENTION

Modern mobile telecommunications networks such as the Pan-European Cellular System respective the Global System for Mobile Communications GSM allow the transfer of Short Messages between subscribers. An introduction to the GSM system can be found in [1], Jerry D. Gibson, THE COMMUNICATIONS HANDBOOK, CRC PRESS, Boca Raton 1997, Chapter 87, pages 1226 ff. Below references are also given to [2], B. Walke, Mobilfunknetze und ihre Protokolle, Band 1, B.G. Teubner Verlag, Stuttgart 2000 and to [3], GSM Specification 03.40 concerning the technical realisation of the Short Message Service (SMS), the latter

being herein incorporated by reference in its entirety. The transfer of Short Messages originating in a network working according to TCP/IP internetworking protocols and transferred and delivered through the GSM system to a subscribers mobile station MS according to [3], GSM Technical Specification 03.40, is described in [4], U.S. Patent No. 5,768,509. Internetworking protocols TCP/IP are described in Andrew S. Tanenbaum, Computer Networks, Prentice-Hall Inc., Englewood Cliffs NJ 1989, 2nd Edition, pages 358-365 and 429-433 and in [1], pages 702 - 704.

The GSM system uses the Signalling System Number 7 which has been enhanced by a Mobile Application Part (MAP) which is specified in [5] GSM Technical Specification 09.02 (Mobile Application Part (MAP) specification) as well as TDMA is enhanced with the IS-41 protocol. A description of Signalling System Number 7 and the IS-41 protocol is given in [1], chapter 35, pages 480 to 495 respective [1], chapter 80.3, pages 1121-1123.

Transfer of short messages is preferably performed in the control channels SDCCH and SACCH (see [3], page 201). The protocol architecture of the Short Message System is shown in [3], chapter 9, page 30.

Transfer of short messages between terminals, mobile stations MS or fixed stations including data terminals, requires a service centre SC which is capable of

a) receiving a short message from a mobile station or over an interface from a data terminal within a TCP/IP network,

b) submitting a Short Message to a mobile station or over an interface from a data terminal within a TCP/IP network and

c) receiving and returning reports relating to sent or received short messages.

Fundamental procedures regarding the transfer of a short message from a service centre SC to a mobile station MS are shown in [3], pages 56 and 57; see also [3], Annex 2.

The short message is forwarded by the service centre SC to a gateway function GMSC which is a function of a mobile services switching centre MSC. The gateway GMSC is capable of interrogating a home location register HLR which contains routing information to the visitor location register VLR. The visitor location register VLR is the functional unit that attends to a mobile station MS operating outside the area of the home location register. A visiting mobile station MS is automatically registered at the nearest mobile services switching centre MSC and the visitor location register VLR is informed accordingly. Based on the retrieved routing information the gateway GMSC forwards the short message to the visited mobile services switching centre MSC. The visited mobile services switching centre MSC retrieves corresponding subscriber information from the visitor location register VLR based on which the short message is forwarded to the mobile station MS. Operations are terminated by returning a delivery report to the service centre SC of the network where the short message has been initiated.

Fundamental procedures regarding the transfer of a short message within a GSM system from a mobile station MS to a service centre SC are shown in [3], pages 64 and 65.

A method and a wireless application message server WAMS (see figure 2) for conveying messages, particularly short messages, originating in a mobile telecommunications network such as the GSM system and terminating in an IP network is disclosed in [8], International Patent Application PCT No. PCT/CH 01/00012 which herein is incorporated by reference in its entirety.

As described in [4], column 3, lines 55-67 a service centre SC preferably provides the capability of interfacing to external entities through an IP-TCP short message client interface. Other service centres SC may use instead of the internet protocol IP the X.25 PLP Packet Layer Protocol as described in [6], chapter 5.5.1, pages 350-358, and a corresponding transport protocol on top of X.25 PLP Packet Layer Protocol and underlying X.25 layers 1 and 2 as described in [6], chapter 6.3, pages 411-420.

Vendors have developed proprietary protocols in order to send and receive short messages transferred over a selected transport layer as described above.

Using the Short Message Peer to Peer Protocol Specification v3.4, issued 1999 by the SMPP Developers Forum, an external short message entity may initiate an application layer connection with a service centre SC over a TCP/IP or an X.25 network connection and may then send and receive short messages to and from the service centre SC respectively (see [7], SMPP Protocol Specification v3.4, chapter 1.1., page 8).

According to the described method external short message entities must therefore use a proprietary application according to the SMPP- or another proprietary protocol in order to exchange short messages with a service centre SC incorporating an interface working according to said proprietary protocol. (see for example [7], chapter 2.1, page 13, figure 2-1).

The commonly used proprietary service centre SC to short message entities SME interface specifications are listed in [7], ETSI technical report ETSI TR 123 039 V.3.2.0 (September 2000), on pages 5 and 6 as follows:

a) Short Message Peer to Peer (SMPP) Interface Specification (SMPP Forum)

b) Short Message Service Centre external machine interface (Computer Management Group)

c) SMSC to SME Interface Specification (Nokia Networks)

d) SMSC Open Interface Specification (SEMA Group)

e) SMSC Computer Access Service and Protocol Manual (Ericsson)

Applications operating in the Internet, below called clients, need therefore to implement and maintain at least one of said proprietary protocols. Service centres SC are therefore unable to provide access to short message services to all Internet users. In case that a client accesses a different service centre SC a peer-to-peer condition may not be established due to the use of different protocols.

The present invention is therefore based on the object of specifying a method, a message server, a service centre comprising said message server and a telecommunications network for conveying messages, particularly short messages, between a mobile telecommunications network such as the GSM system and clients in an IP network, such as the Internet, which are using a standardised communication protocol such as the Hypertext Transfer Protocol HTTP.

It is a further object of the present invention of integrating said message server into a service centre SC in such a way that application of proprietary protocols is avoided thus significantly reducing complexity of service centres.

SUMMARY OF THE INVENTION

The above and other objects of the present invention are achieved by a method, a message server, a service centre comprising said message server, and a telecommunications

network according to claim 1 respective claim 6, claim 12 respective claim 13.

The inventive method allows to convey messages, particularly short messages between a service centre SC of a mobile telecommunications network such as the GSM system and clients in an IP network, such as the Internet, which are using a standardised communication protocol such as the Hypertext Transfer Protocol HTTP or a derivative therefrom.

According to the present invention messages are received in a message server from a service centre SC based on a protocol used in said service centre SC. The messages are converted into messages based on the standardised communication protocol used by the clients in the IP network and then forwarded to the addressed clients.

On the other hand messages received in said message server EMS from clients in the IP network based on a protocol used by said clients are converted into messages based on the communication protocol used by the service centre SC and then forwarded to the service centre SC.

In a first embodiment of the invention the service centre SC and the message server exchange messages based on a proprietary protocol preferably as specified in [9], ETSI Technical Report ETSI TR 123 039 V.3.2.0 (2000-09).

In a preferred embodiment of the invention the service centre SC and the message server exchange messages based on the protocol used in the transport or the application layer SM-TL respective SM-AL of the protocol architecture of the short message service system thus avoiding the use of proprietary protocols and reducing the complexity of the service centre SC when integrating the inventive message server into the service centre SC.

The inventive message server and clients in the IP network exchange messages based on the Hypertext Transfer Protocol HTTP or an advanced derivative therefrom. Since the Hypertext Transfer Protocol HTTP is used by practically all web browsers and CGI applications, clients using the Internet which are registered at the service centre SC or the message server will be able to send and receive messages without the implementation of proprietary protocols.

The functions of the message server can further be expanded in order to provide authorisation control functions, security control functions and/or administrative functions.

Integration of the inventive message server into a telecommunications network is easily possible thus reducing complexity of the network and the service centres installed therein.

BRIEF DESCRIPTION OF THE DRAWINGS

Some of the objects and advantages of the present invention have been stated, others will appear when the following description is considered together with the accompanying drawings, in which:

Fig. 1 shows a known telecommunications network designed to convey messages originating in the Internet or an Intranet and terminating in mobile stations of a first or a second public land mobile network PLMN;

Fig. 2 shows a telecommunications network with an inventive message server EMS capable of conveying messages between mobile stations MS of a first or a second public land mobile network PLMN and clients CL using the Internet or an Intranet;

Fig. 3 shows the protocol architecture implemented in an inventive message server EMS;

Fig. 4 shows the basic transactions performed for transferring a message from a first service centre SC1 through the inventive message server EMS to a client CL;

Fig. 5 shows the basic transactions performed for transferring a message from a client through the inventive message server EMS to the service centre SC1 and

Fig. 6 shows a preferred embodiment of the inventive message server EMS integrated into a service centre SCa.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Fig. 1 shows a known telecommunications network designed to convey messages originating in the Internet or an Intranet and terminating in mobile stations of a first or a second public land mobile network PLMN1 respective PLMN2. The structure of a GSM public land mobile network PLMN is shown and described in [1], pages 1226 to 1228. For TDMA systems using the IS-41 protocol and CDMA systems using the IS-95 protocol see [1], chapter 80.3, pages 1121-1123 respective [1], chapter 89, pages 1257-1263.

A GSM public land mobile network can be viewed as a configuration comprising

a) a user level with voice and data terminals MS1, MS2, MS3, PC1, PC2 and SP;

b) a network level with mobile services switching centres MSC1, MSC2; short message service centres SC1, SC2; gateway functions GMSC and interworking functions IWMSC belonging to a mobile services switching centre MSC and base station

tranceivers BTS and thereto related base station controllers BSC;

c) a database level with home location registers HLR, visitor location registers VLR and Equipment Identity registers (not shown as this optional network entity is not relevant for the scope of this document) and

d) a signalling level working according to the Signalling System No. 7 with signalling points connected to the elements of the database level and with signalling points connected to the switching elements of the network layer.

In a different view the mobile stations MS, the base station tranceivers BTS and thereto related base station controllers BSC are contained in a Radio Subsystem, the mobile services switching centres MSC1, MSC2; short message service centres SC1, SC2; gateway functions GMSC and interworking functions IWMSC as well as the home location and visitor location registers HLR, VLR are contained in a Network and Switching Subsystem NSS and a Operation and Maintenance Centre (not shown), an Authentication Centre (not shown) and an Equipment Identity Register (not shown) are contained in an Operation Subsystem.

Fundamental procedures regarding the transfer of a short message between mobile stations MS and clients CL using of an IP network through a service centre SC and, if required, through a wireless application message server (WAMS, see Fig. 2) were described above.

The service centre SC1 shown in Fig. 1 may, as described in [4], be a work station comprising a memory to store short messages and subscriber data. The service centre SC1 is over a gateway and interworking functions on one side connected to the mobile switching services centre MSC1. On the other side over a

TCP/IP interface SMS-IF the service centre SC1 is connected to Internet or Intranet network entities SP and CL which comprise services and applications capable of sending messages to the service centre SC1 where the addresses of said services and application are stored in a database. Preferably individual subscribers CL access the service centre SC1 over a service provider SP.

As described above known service centres SC, as the one described in [4], comprise the capability of interfacing to external entities through a short message client interface which may be using the internet protocols TCP/IP or the X.25 protocol. Commonly used proprietary interface specifications respective protocols PP for transferring messages between the service centre SC and the short message entities SME are listed in [7], pages 5 and 6.

Fig. 2 shows an inventive telecommunications network capable of conveying messages between mobile stations MS1 and MS2 of a first or a second public land mobile network PLMN1, PLMN2 and clients CL in the Internet or in an Intranet. As drawn in Fig. 2 the messages are forwarded from the first service centre SC2, accessed by the mobile stations MS1 and MS2, preferably over a wireless application message server WAMS, which is described in [8], to the second service centre SC1 on a path shown with virtual connections vc1 and vc2.

According to the present invention messages exchanged between a service centre SC1 and clients CL in the Internet are sent through a message server EMS which, as shown in Fig. 3 converts the protocol HTTP used by the clients CL to the protocol PP, PP1, ... used by the service centre SC. HTTP-requests sent by the clients CL are therefore translated into requests adhering to the protocol PP, PP1, ... used by the service centre SC.

The message server EMS could be located at the premises of the operator of the service centre SC1. Both systems, the message server EMS and the service centre SC1 may form a system SCS which is controlled by a single control unit, e.g. the control unit EMSC of the message server. An inventive message server EMS may however be connected to several service centres SC.

The Hypertext Transfer Protocol HTTP is, as described in Andrew S. Tanenbaum, Computernetzwerke, Prentice-Hall Inc., München 1998, 3rd edition, chapter 7.6.2.1, pages 726-728, a standard transfer protocol in the world wide web. Clients CL may use the Transport Control Protocol TCP or an underlying ATM network (see [11], pages 4-10) for transferring HTTP-requests. The Hypertext Transfer Protocol HTTP allows to send requests to a HTTP sever and to receive corresponding replies.

Essential communication methods specified in the Hypertext Transfer Protocol HTTP are GET, PUT and POST.

The PUT method requests that the enclosed entity be stored under the supplied Request-URI. If the Request-URI refers to an already existing resource, the enclosed entity could be considered as a modified version of the one residing on the origin.

In order to transmit messages between a client CL and the inventive message server EMS preferably the GET and/or the POST methods are used.

The GET method means retrieve whatever information (in the form of an entity) is identified by the Request-URI. If the Request-URI (Uniform Resource Identifier) refers to a data-producing process, it is the produced data which shall be returned as the entity in the response.

The POST method is used to request that the origin server accept the entity enclosed in the request as a new subordinate of the resource identified by the Request-URI in the Request-Line. POST is designed to allow a uniform method to cover the following functions:

- Annotation of existing resources;
- Posting a message for example to a bulletin board, a newsgroup, a mailing list

For sending a short message over the mobile telecommunications network to a mobile station MS a client CL sends a HTTP-request enclosing the corresponding message to the inventive message server EMS. The message incoming at the message server EMS is translated and formatted according to the specifications of the receiving system which may be the proprietary protocol of a vendor of service centres SC (see Fig. 3) or the protocol implemented in the SMS transport or application layer SM-TL or SM-AL (see Fig. 6).

For example the incoming content has to be tailored to 160 characters. In case that CIMD2 is used as a proprietary protocol special characters have to be replaced according to CIMD2 encoding rules.

Short messages incoming from mobile stations MS are forwarded from the service centre SC to the inventive message server EMS therein translated and reformatted and sent with an HTTP request to the addressed clients CL as further described below.

For short messages incoming from mobile stations MS one or more accounts of the service centre SC need to be monitored. Every incoming short message triggers a predefined action, e.g. initiating a HTTP request sent to an addressed client.

The client CL could receive HTTP requests (POST) as follows:

```
<?xml version="1.0"?>
<SMS MessageID="11223344">
            <Sender>+41765552211</Sender>
            <Text>ITEMS SOLD</Text>
            <Time>12:02:00</Time>
            <Date>12.01.2001</Time>
</SMS>
```

On the other hand the client CL could use a similar format to send a short message to a mobile station MS by using a HTTP request as follows:

```
<?xml version="1.0"?>
<SMS>
            <Destination>+41765552211</Destination>
            <Text>PLEASE CALL PHONE NUMBER 800 33 22</Text>
</SMS>
```

In order to perform said HTTP requests for executing transfers of short messages simple PUSH/PULL routines have to be set up which act as an interface between a client CL and the message server EMS.

The PUSH/PULL routines may be set up by using the Simple Object Access Protocol SOAP, which is a lightweight and simple XML-based protocol that is designed to exchange structured and typed information on the Web. The eXtensible Markup Language XML is a meta-markup language that provides a format for describing structured data. Binding SOAP to HTTP provides the advantage of being able to use the formalism and decentralised flexibility of SOAP with the rich feature set of HTTP. The purpose of SOAP is to enable rich and automated Web services based on a shared and open Web infrastructure. SOAP can be used in combination with a variety of existing Internet protocols

and formats including HTTP, SMTP, and MIME and can support a wide range of applications including messaging systems. Information and specifications relating to SOAP are available under

http://msdn.microsoft.com/xml/general/soapspec.asp.

As shown in Fig. 3 the message server EMS acts towards clients CL in the Internet as an HTTP server which translates messages according to proprietary protocols PP1, PP2, ... of an application which communicates with a peer entity in the service centre SC1. A protocol converter CP shown in the protocol architecture EMS-PA is responsible for the translation of the transferred messages.

In order to communicate with service centres SC1, ..., SCx using different proprietary protocols PP1, PP2, ... the message server EMS is instructed by a control unit EMSC to select the applicable protocol PP1 or PP2; etc. ... accordingly.

The transactions performed during a transfer of a message from the service centre SC1 through the message server EMS to a client CL are shown in figure 4.

The delivery of a short message from the service centre SC1 to the message server EMS is based on the proprietary protocol PP2. The translated short message is pushed forward to the addressed client based on the HTTP protocol. In reply the client CL sends a response which is forwarded to the service centre SC1 in order to acknowledge receipt and to delete the stored message.

The transfer of a message from a client CL through the message server EMS to the service centre SC1 is shown in figure 5.

Based on a HTTP request the short message is forwarded to the message server EMS, which according to the proprietary protocol

PP2 translates and forwards the message to the service centre SC1. Receipt of the short message is acknowledged by a message which is routed back to the client CL.

In the preferred embodiment shown in Fig. 6 the message server EMS is integrated into the service centre SCa thus completely avoiding the use of proprietary protocols.

Fig. 6 also shows the protocol stack of the Signalling System No. 7 which carries the short message transport layer SM-TL and the short message application layer SM-AL on top (see [3], page 30).

The protocol architecture of Signalling System No.7 comprises

a) a Message Transfer Part MTP consisting from bottom to top of

   a1) Signalling Data Link Functions (MTP Level 1) corresponding to Layer 1 of the OSI Model,

   a2) Signalling Link Functions (MTP Level 2) corresponding to Layer 2 of the OSI Model and

   a3) Signalling Network Functions (MTP Level 3) corresponding to a first part of Layer 3 of the OSI Model;

b) a Signalling Connection Control Part (SCCP) enhancing the functions of MTP Level 3 in order to provide the functional equivalent of OSI's network layer 3 and

c) application protocols (corresponding to Layer 7 applications of the OSI Model) such as the Transaction Capabilities Application Part (TCAP) which provides services for User Parts such as the Mobile Application Part (MAP) which was created for the GSM system.

In order to enable subscribers of the GSM system to exchange short messages the protocols of the Short Message Transfer Layer SM-TL have been created. The services provided by the Short Message Transfer Layer SM-TL enable the application layer SM-AL above to transfer short messages to its peer entities. The Short Message Transfer Layer SM-TL comprises Protocol Data Units PDU:

SMS-DELIVER conveying a short message from the service centre SC to the mobile station MS,

SMS-SUBMIT conveying a short message from the mobile station MS to the service centre SC,

SMS-COMMAND conveying a command from the mobile station MS to the service centre SC

and SMS-DELIVER-REPORT, SMS-SUBMIT-REPORT, SMS-STATUS-REPORT.

The structure of a protocol data unit TPDU at the transport layer SM-TL, which is shown an described in [3], pages 35 and 36 comprises an element TP-UD (TP-User Data) into which user data are mapped. The element TP-OA on the other hand receives the originating address of the client CL.

As described above HTTP provides means for transferring short message data between a client and the message server EMS which is preferably integrated into a service centre SCa. According to internetworking protocols TCP/IP a HTTP server is accessed over port which is addressed by the IP address and the port number. HTTP servers respective web browsers or CGI applications usually use port number 80.

Extraction of data out of an HTTP message is normally performed by an application using the Common Gateway Interface CGI, which is described in [10] on pages 742 and 743. The Common Gateway Interface CGI is addressed by a URI (Uniform Resource

Identifier); when using a HTTP GET request data are delivered with the URL (Uniform Resource Locator); when using a HTTP POST request the data are delivered within the body of the request.

According to the present invention the content respective the user data are extracted out of a HTTP message received from a client CL and mapped into the TP-User Data element of a protocol data unit TPDU. Further data, for example address information, as specified in [3], is mapped into other elements of the protocol data unit TPDU before it is delivered to the addressed mobile station MS.

Protocol data units TPDU received from a mobile station MS are treated accordingly. The user data is extracted out of the TP-User Data element and directly transferred into a HTTP message.

As seen in figure 2 the message server EMS is preferably connected to a control unit EMSC which, besides the control of the above described communication functions, may also provide administrative, authorisation and security control functions. This is easily possible since messages passing the message server EMS are analysed and translated respective reformated. The control unit EMSC has therefore access to the address data of clients CL and may provide or deny access. The message server EMS may count the transferred data bits for billing the involved charges to the account corresponding to the originating address. The control unit EMSC may further check the transferred data for patterns which are to be suppressed or rejected.

The above described protocols may be further developed in the future which will facilitate the implementation of the above described invention for a man skilled in the art.

[1] Jerry D. Gibson, THE COMMUNICATIONS HANDBOOK, CRC PRESS, Boca Raton 1997

[2] B. Walke, Mobilfunknetze und ihre Protokolle, Band 1, B.G. Teubner Verlag, Stuttgart 2000

[3] GSM Specification 03.40 concerning the technical realisation of the Short Message Service (SMS) respective ETSI European Telecommunication Standard ETS 300 536 (October 1994)

[4] U.S. Patent No. 5,768,509 (Günlük)

[5] GSM Technical Specification 09.02 (Mobile Application Part (MAP) specification) respective ETSI European Telecommunication Standard ETS 300 599 (February 1995)

[6] Andrew S. Tanenbaum, Computer Networks, Prentice-Hall Inc., Englewood Cliffs NJ 1989, 2nd Edition

[7] SMPP Developers Forum, Short Message Peer to Peer Protocol Specification v3.4, October 12, 1999, Issue 1.2

[8] International Patent Application PCT No. PCT/CH 01/00012

[9] ETSI Technical Report ETSI TR 123 039 V.3.2.0 (2000-09) Digital cellular telecommunications system (Phase2+) (GSM) Universal Mobile Telecommunications System UMTS; Interface Protocols for the connection of Short Message Service Centres (SMSCs) to Short Message Entities (SMEs); (3GPP TR 23.039 version 3.2.0 Release 1999)

[10] Andrew S. Tanenbaum, Computernetzwerke, Prentice-Hall Inc., München 1998, 3. Auflage

[11] H. Orlamünder, IP und ATM, Der Fernmeldeingenieur, Verlag für Wissenschaft und Leben Georg Heidecker GmbH, Heft 4/'99, Erlangen 1999

CLAIMS

1. A method for conveying messages, particularly short messages between a service centre (SC) of a mobile telecommunications network such as a GSM, TDMA, CDMA or 3G (MMS) system and clients (CL) in an IP network, such as the Internet, which are using a standardised communication protocol such as the Hypertext Transfer Protocol HTTP or a derivative therefrom comprising the steps of

   a) receiving messages in a message server (EMS) from the service centre (SC) based on a protocol used in said service centre (SC), converting said messages into messages based on the standardised communication protocol used by clients (CL) in the IP network and forwarding the converted messages to addressed clients (CL) and

   b) receiving messages in said message server (EMS) from clients (CL) in the IP network based on a protocol used by said clients (CL), converting said messages into messages based on the communication protocol used by the service centre (SC) and forwarding the converted messages to the service centre (SC).

2. Method according to claim 1, in which the service centre (SC) and the message server (EMS) exchange messages based on a proprietary protocol preferably as specified in ETSI Technical Report ETSI TR 123 039 V.3.2.0 (2000-09).

3. Method according to claim 1, in which the service centre (SC) and the message server (EMS) exchange messages based on the protocol used in the transport layer (SM-TL) application layer (SM-AL) of the protocol architecture of the short message service system.

4. Method according to claim 3, in which

address and user data are extracted out of a message received from the client (CL) and being directly mapped into a protocol data unit (TPDU) of the SMS transport layer SM-TL and/or

address and user data are extracted out of protocol data unit (TPDU) of the SMS transport layer SM-TL and being directly mapped into a message forwarded to the client (CL).

5. Method according to one of the claims 1 to 4, in which a control unit (EMSC) connected to the message server (EMS) additionally performs authorisation control, security control and/or billing functions in view of the served clients (CL).

6. Message server (EMS) for conveying messages, particularly short messages between a service centre (SC) of a mobile telecommunications network such as a GSM, TDMA, CDMA or 3G (MMS) system and clients (CL) in an IP network, such as the Internet, which are using a standardised communication protocol such as the Hypertext Transfer Protocol HTTP or a derivative comprising a protocol architecture with a conversion stage on the application layer for

a) converting messages received from the service centre (SC) based on a protocol used in said service centre (SC) into messages based on the communication protocol used by the clients (CL) in the IP network and

b) converting messages received from clients (CL) in the IP network based on a protocol used by said client (CL) into messages based on the communication protocol used by the service centre (SC).

7. Message server (EMS) according to claim 6, in which the message server (EMS) for the communication with the service centre (SC) uses at least one proprietary protocol preferably as specified in ETSI Technical Report ETSI TR 123 039 V.3.2.0 (2000-09).

8. Message server (EMS) according to claim 6, in which the message server (EMS) for the communication with the service centre (SC) uses a protocol used in the transport layer SM-TL or the application layer SM-AL of the protocol architecture of the short message service system.

9. Message server (EMS) according to claim 8, in which the message server (EMS) is capable of

extracting address and user data are out of a message received from a client (CL) and directly mapping said data into a protocol data unit (TPDU) of the SMS transport layer SM-TL and/or

extracting address and user data out of a protocol data unit TPDU of the SMS transport layer SM-TL and directly mapping said data into a message to be forwarded to the client (CL).

10. Message server (EMS) according to one of the claims 6 to 9, comprising a control unit (EMSC) allowing to select and implement stored protocols (PP1, PP2, ...) in order to establish peer-to-peer connections between the message server (EMS) and a connected service centre (SC).

11. Message server (EMS) according to one of the claims 6 to 9, comprising a control unit (EMSC) providing authorisation control, security control and/or billing functions.

12. Service centre (SCa) for a mobile telecommunications network such as a GSM, TDMA, CDMA or 3G (MMS) with an

interface for the connection system and clients (CL) in an IP network, such as the Internet, which are using a standardised communication protocol such as the Hypertext Transfer Protocol HTTP or a derivative, said service centre comprising a message server (EMS) according to claim 8, said message server (EMS) being capable of

extracting address and user data are out of a message received from a client (CL) and directly mapping said data into a protocol data unit (TPDU) of the SMS transport layer SM-TL and/or

extracting address and user data out of a protocol data unit TPDU of the SMS transport layer SM-TL and directly mapping said data into a message to be forwarded to the client (CL).

13. Telecommunications network for conveying messages, particularly short messages, between a service centre (SC) of a mobile telecommunications network such as a GSM, TDMA, CDMA or 3G (MMS) system and clients (CL) in an IP network, such as the Internet, which are using a standardised communication protocol such as the Hypertext Transfer Protocol HTTP or a derivative said mobile telecommunications network comprising a message server (EMS) according to one of the claims 6 to 11 and or a service centre (SCa) according to claim 12.

Fig. 1

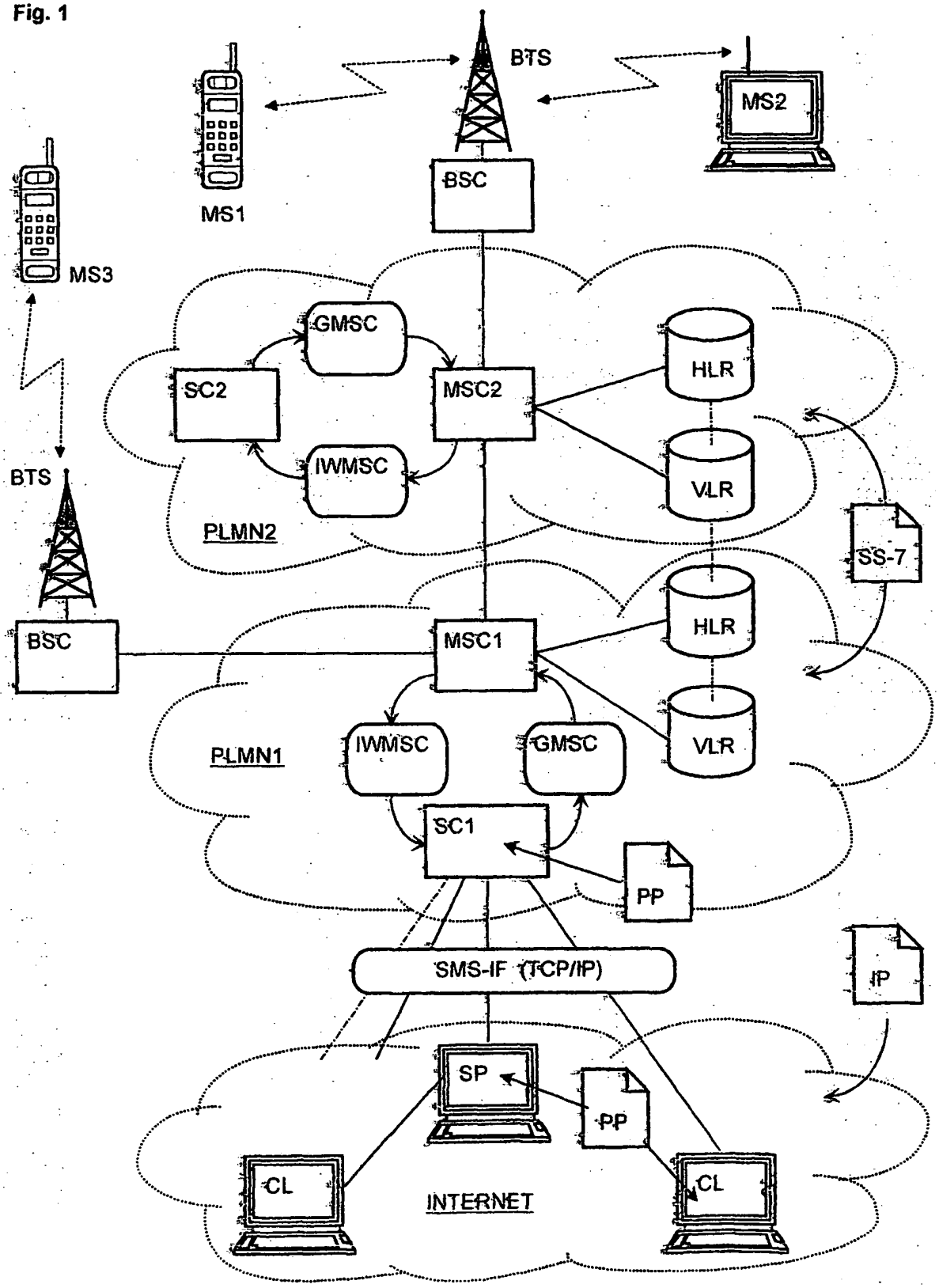

BTS
MS2
MS1
BSC
MS3
GMSC
SC2
MSC2
HLR
IWMSC
VLR
BTS
PLMN2
SS-7
BSC
MSC1
HLR
PLMN1
IWMSC
GMSC
VLR
SC1
PP
SMS-IF (TCP/IP)
IP
SP
PP
CL
INTERNET
CL

Fig. 2

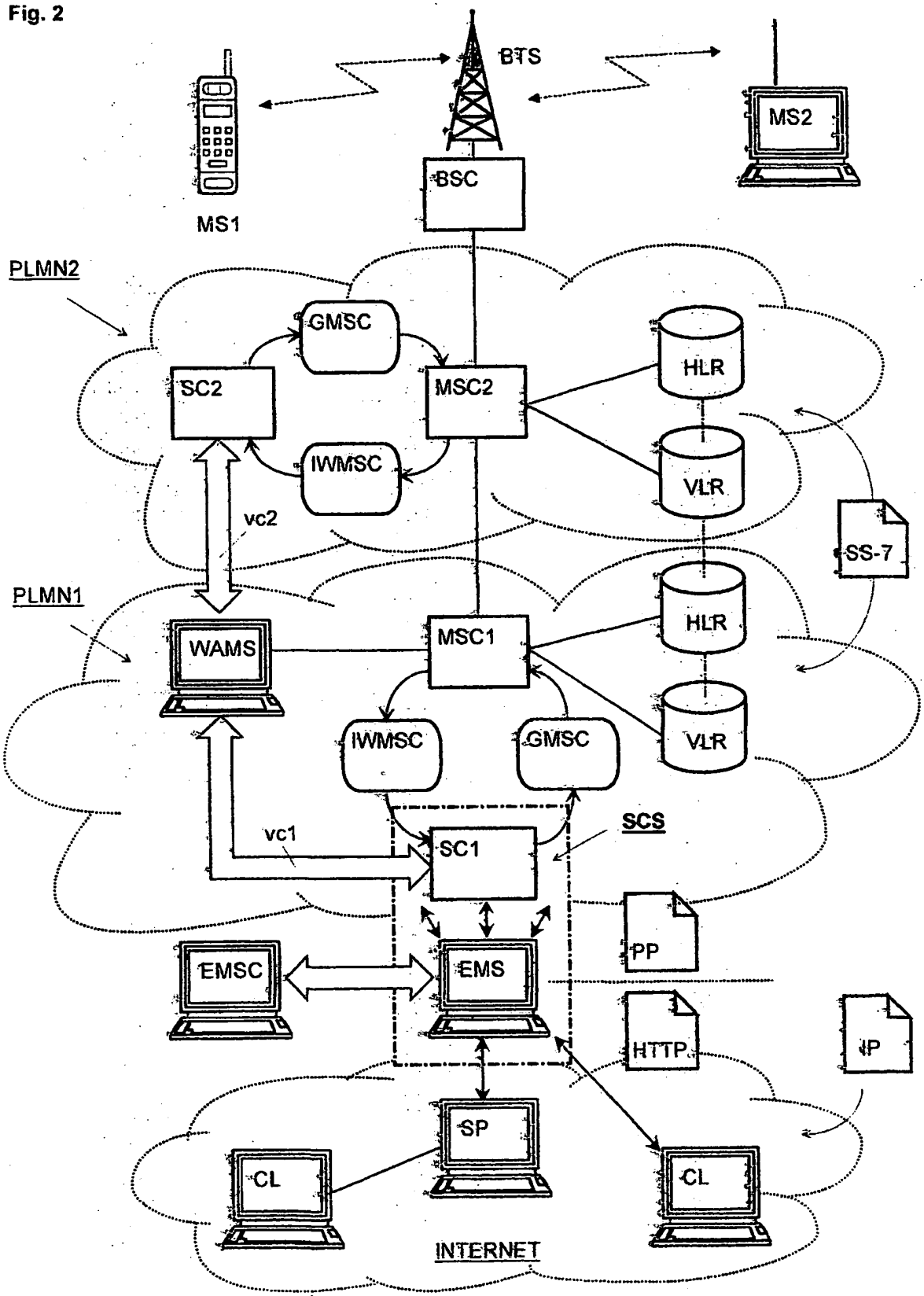

BTS
MS2
BSC
MS1
PLMN2
GMSC
SC2
MSC2
HLR
IWMSC
VLR
vc2
SS-7
PLMN1
WAMS
MSC1
HLR
IWMSC
GMSC
VLR
SCS
vc1
SC1
PP
EMSC
EMS
HTTP
IP
SP
CL
CL
INTERNET

Fig. 3

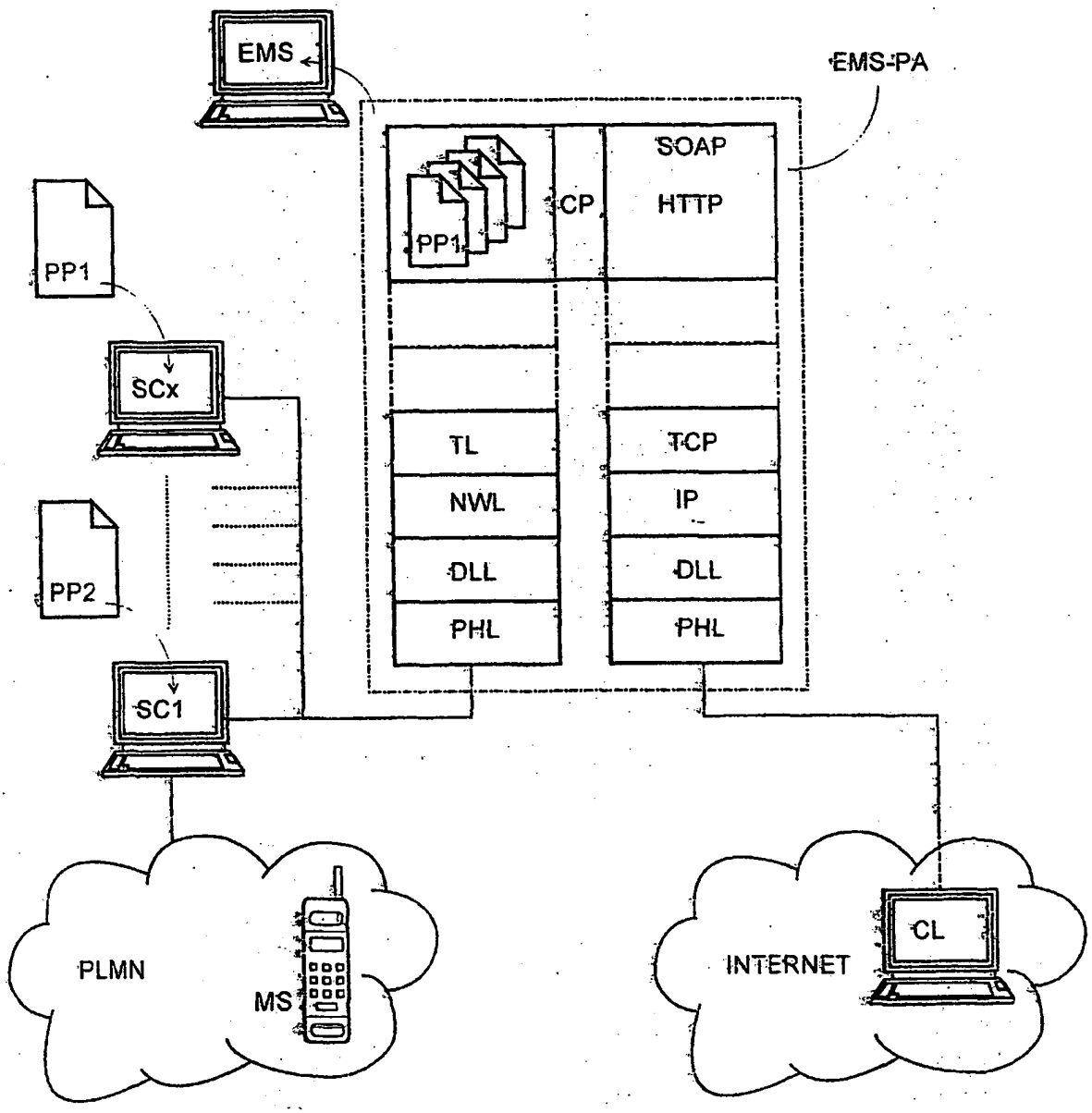

EMS
EMS-PA
SOAP
HTTP
CP
PP1
PP1
SCx
PP2
SC1
TL
NWL
DLL
PHL
TCP
IP
DLL
PHL
PLMN
MS
INTERNET
CL

Fig. 4

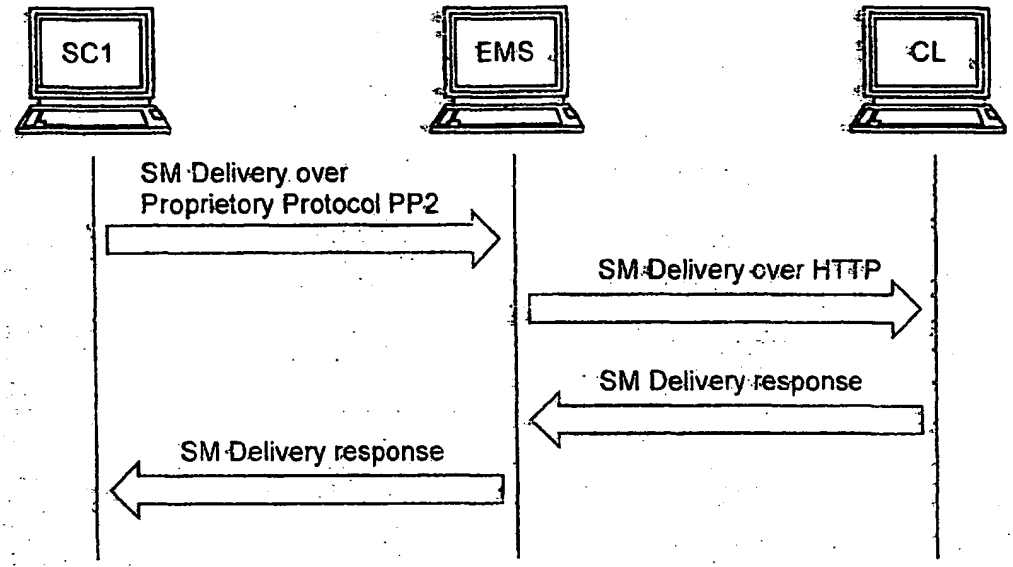

SC1
EMS
CL
SM Delivery over
Proprietory Protocol PP2
SM Delivery over HTTP
SM Delivery response
SM Delivery response

Fig. 5

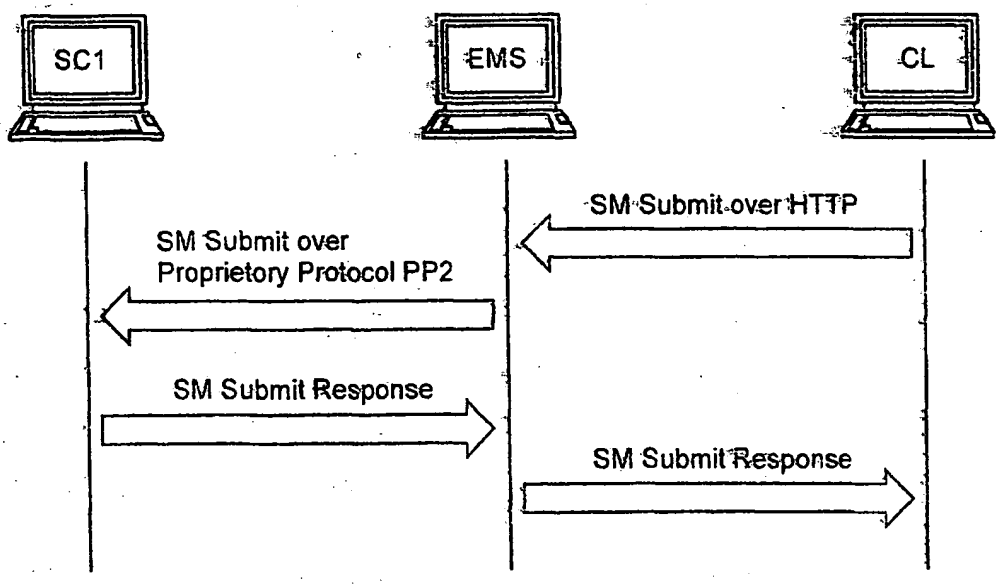
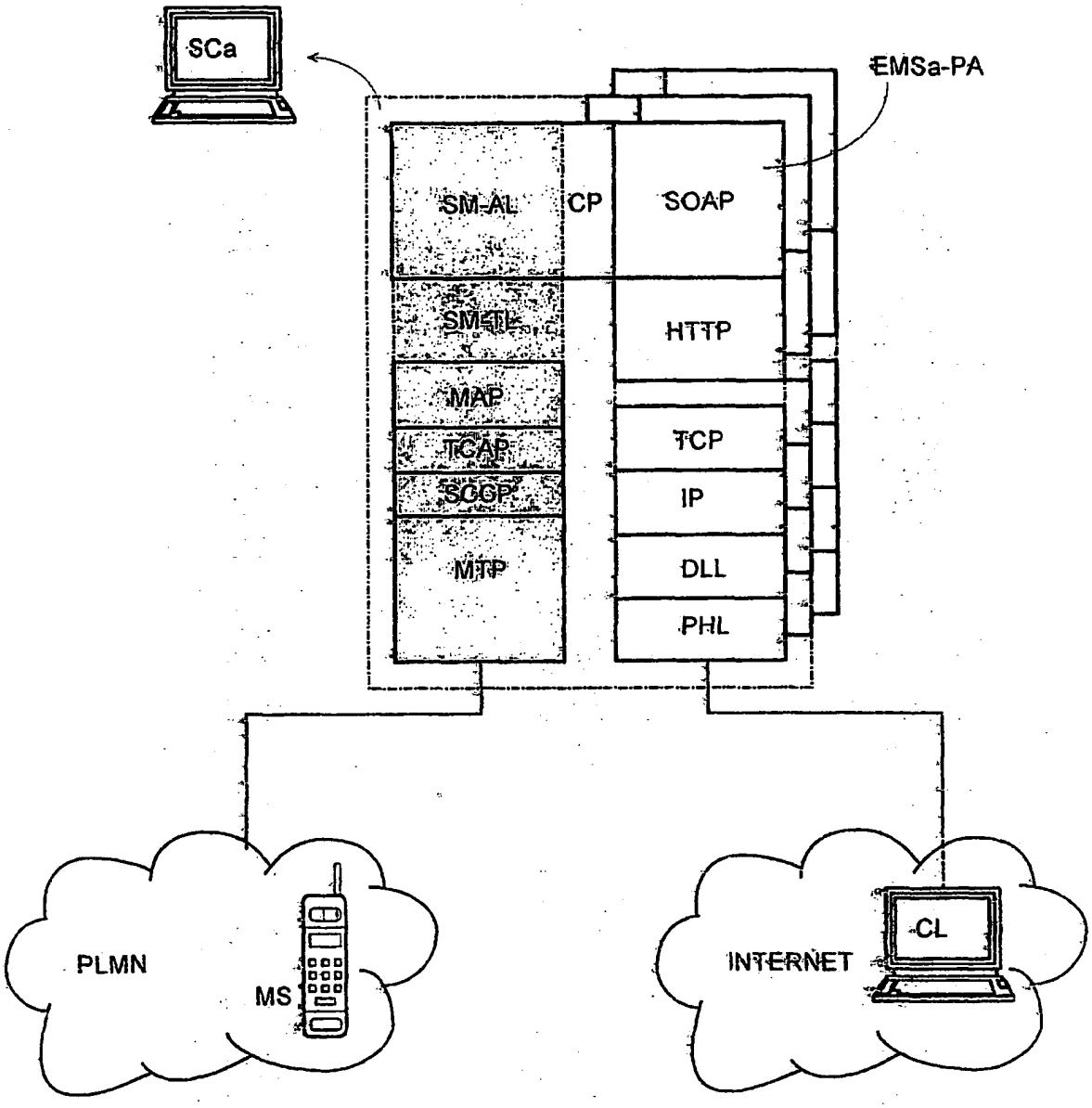

SC1
EMS
CL
SM Submit over HTTP
SM Submit over
Proprietory Protocol PP2
SM Submit Response
SM Submit Response

Fig. 6


SCa
EMSa-PA
SM-AL
CP
SOAP
SMTL
HTTP
MAP
TCAP
SCCP
MTP
TCP
IP
DLL
PHL
PLMN
MS
INTERNET
CL

INTERNATIONAL SEARCH REPORT

Inter nal Application No
PCT/CH 01/00057

A. CLASSIFICATION OF SUBJEC TER
IPC 7 H04Q7/22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 134 432 A (MUNRO ROB ET AL) 17 October 2000 (2000-10-17) column 1, line 65 -column 2, line 21 column 3, line 15 - line 54 column 4, line 1 - line 6 column 4, line 58 -column 5, line 26 column 10, line 53 - line 59 column 11, line 29 - line 58 ---	1-13
A	WO 98 47270 A (NOKIA TELECOMMUNICATIONS OY ;TUOMINEN JOONAS (FI)) 22 October 1998 (1998-10-22) page 16, line 19 -page 17, line 11 ---	1,6,12, 13
	-/--	

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
4 September 2001	14/09/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Bernedo Azpiri, P

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INTERNATIONAL SEARCH REPORT

Inte nal Application No
CH 01/00057

C.(Continuation) DOCUMENTS C DERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

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			CA	2230544 A	06-03-1997
			CN	1199534 A	18-11-1998
			EP	0872128 A	21-10-1998
			JP	11511608 T	05-10-1999
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			NZ	316656 A	28-07-1998
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			SE	9502995 A	26-08-1996
			US	6205330 B	20-03-2001